HV/LV distribution transformers

TRIHAL cast resin dry type transformers 160 to 3150 kVA insulation level ⩽ 24 kV - low voltage 400 to 433 V - 50 Hz thermal class F - ambient ⩽ 40°C, altitude ⩽ 1000 m

standards

In accordance with standards:
- IEC 76-1 to 76-5;
- IEC 726 (1982);
- CENELEC (European Committee for Electrotechnical standardization) harmonization documents HD 538-1 S1: 1992 and HD 464 S1: 1988 / A2: 1991 / A3: 1992 concerning dry type transformers.
- IEC 905.

common electrical characteristics

frequency (1)	50Hz
maximum ambient temperature	40°C
secondary voltage at no load (1)	400 to 433V between phases, 231 to 250V phase to neutral
HV tapping range (off-circuit) (1)	±2.5%, ±5%
vector group	Dyn (delta, star neutral brought out)
partial discharges (5)	⩽10 pC at 1.1 Um

electrical characteristics for insulation level: 7.2 kV and 12 kV

rated power (kVA) (1) (*)		**160** (2)	**250**	**400**	**500**	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**
rated primary voltage (1)		5 to 11kV (dual voltage on request)											
rated insulation level (3)		7.2kV for 5kV - 12kV for 11kV											
losses (W)	no load losses	**610**	**820**	**1150**	**1200**	**1370**	**1700**	**2000**	**2500**	**2800**	**3500**	**4300**	**5200**
	load losses at 75°C	2300	3100	4300	5700	6700	7700	8800	10500	12300	14900	18300	21800
	load losses at 120°C	**2700**	**3500**	**4900**	**6500**	**7600**	**8800**	**10000**	**12000**	**14000**	**17000**	**21000**	**25000**
rated impedance voltage (%)		**4**	**4**	**4**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**
no-load current (%)		2.3	2	1.5	1.5	1.3	1.3	1.2	1.2	1.2	1.1	1	1
switching current	Ie/In (peak value)	13.5	13	13	10	10	10	10	10	9	9	9	9.5
	time constant	0.13	0.18	0.25	0.25	0.3	0.3	0.34	0.35	0.42	0.45	0.5	0.5
efficiency (%)	load 100% cos φ = 0.8 at 120°C	96.03	96.74	97.66	98.11	97.27	96.00	96.39	96.50	96.77	96.90	96.93	97.07
	load 75% cos φ = 0.8 at 120°C	96.57	97.18	97.98	98.41	97.70	96.60	96.92	97.01	97.25	97.35	97.38	97.50
noise level (3)	acoustic power LWA	62	65	68	69	70	72	73	75	76	77	81	81
dB(A)	acoustic pressure LPA at 1 m	51	54	56	57	57	59	60	61	62	62	66	66

electrical characteristics for insulation level: 17.5 kV and 24 kV

rated power (kVA) (1) (*)		**160** (2)	**250**	**400**	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**
rated primary voltage (1)		15 to 22kV (dual voltage on request)										
rated insulation level (3)		17.5kV for 15kV - 24kV for 22kV										
losses (W)	no load losses	**650**	**880**	**1200**	**1650**	**2000**	**2300**	**2800**	**3100**	**4000**	**5000**	**6300**
	load losses at 75°C	2350	3300	4800	6800	8200	9600	11400	14000	17400	20000	23000
	load losses at 120°C	**2700**	**3800**	**5500**	**7800**	**9400**	**11000**	**13100**	**16000**	**20000**	**23000**	**26000**
rated impedance voltage (%)		**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**	**6**
no-load current (%)		2.3	2	1.5	1.3	1.3	1.2	1.2	1.2	1.1	1	1
switching current	Ie/In (peak value)	10.5	10.5	10	10	10	10	10	10	9.5	9.5	9.5
	time constant	0.13	0.18	0.25	0.26	0.3	0.3	0.35	0.4	0.4	0.5	0.5
efficiency (%)	load 100 % cos φ = 0.8 at 120°C	95.98	96.47	97.41	95.49	95.67	96.01	96.18	96.35	96.39	96.62	96.87
	load 75% cos φ = 0.8 at 120°C	96.51	96.95	97.78	96.13	96.29	96.58	96.72	96.90	96.92	97.10	97.29
noise level (3)	acoustic power LWA	59	62	67	69	70	72	73	75	76	78	81
dB(A)	acoustic pressure LPA at 1 m	47	50	55	56	57	58	59	61	61	63	66

(*) the rated power is defined by natural air cooling (AN). Should there be particular constraints, it may be increased by 40 % by forced cooling addition (AF). Please consult us.
(1) other possibilities upon request, consult us.
(2) non standard ratings available on request.

(3) reminder of insulation levels:

rated insulation level (kV)	7.2	12	17.5	24
kV r.m.s. 50 Hz - 1 mn	20	28	38	50
kV B.I.L. 1.2/50 µs	60	75	95	125

(4) according to IEC 551.
(5) according to IEC 270.

Merlin Gerin
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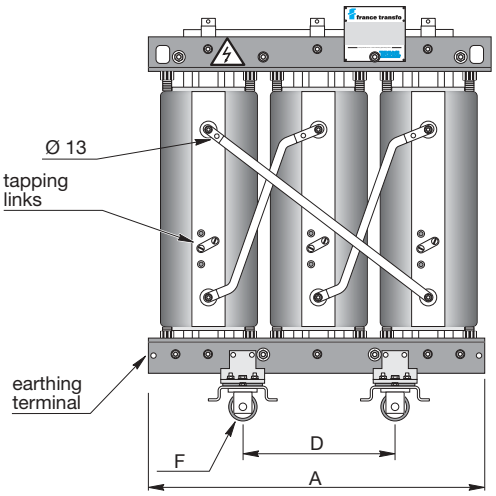
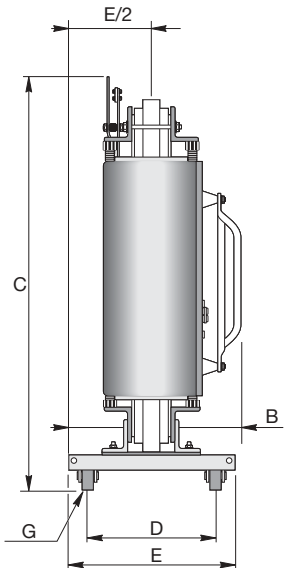
insulation level ⩽ 24 kV - low voltage 400 to 433 V - 50 Hz
thermal class F - ambient ⩽ 40° C, altitude ⩽ 1000 m





dimensions and weights
without enclosure housing (IP00)

Dimensions and weights indicated in the table below are provided as an example for single voltage transformers with insulation level 12kV (1st table) and 24 kV (2nd table), according to electrical characteristics shown page 1.
Consequently, these tables give you approximate dimensions and weights for insulation level from 7.2 to 12kV (1st table) and from 17.5 to 24kV (2nd table).
Only the definitive drawings following from the order will commit us contractually.
For other voltages, impedance voltages and dual-voltages, weights and dimensions are different (consult us).

insulation level: 7.2 kV and 12 kV - low voltage 400 V to 433 V

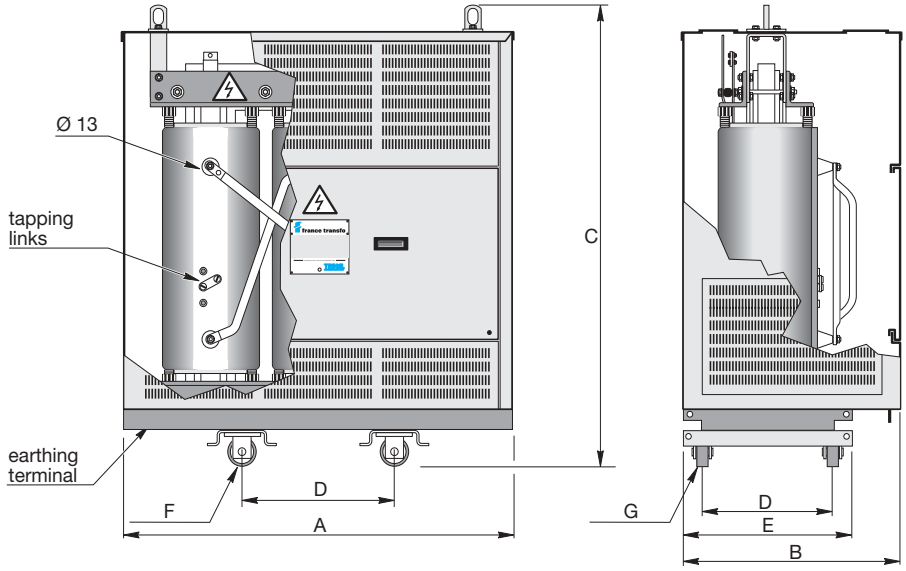
rated power (kVA)		**160**	**250**	**400**	**500**	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**
dimensions (mm)	**Lenght A**	995	1200	1270	1360	1395	1465	1540	1615	1675	1765	1870	2100
	Width B	680	695	795	805	810	825	945	945	945	1195	1195	1195
	Connection height or Maximum height C	1215	1255	1345	1480	1520	1660	1675	1865	2035	2180	2275	2345
	Roller pitch D	520	520	670	670	670	670	820	820	820	1070	1070	1070
	Frame width E	645	645	795	795	795	795	945	945	945	1195	1195	1195
	Roller diam. F	125	125	125	125	125	125	125	125	125	160	160	160
	Roller width G	40	40	40	40	40	40	40	40	40	50	50	50
Weight without enclosure (kg)		810	1000	1260	1500	1670	1840	2220	2720	3400	4200	5050	6750

insulation level: 17.5 kV and 24 kV - low voltage 400 V to 433 V

rated power (kVA)		**160**	**250**	**400**	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**
dimensions (mm)	**Lenght A**	1100	1270	1360	1470	1490	1590	1610	1830	1885	1975	2295
	Width B	695	795	800	825	825	945	945	960	1195	1195	1195
	Connection height or Maximum height C	1285	1325	1415	1725	1735	1870	2010	2060	2325	2350	2400
	Roller pitch D	520	520	670	670	670	820	820	820	1070	1070	1070
	Frame width E	645	645	795	795	795	945	945	945	1195	1195	1195
	Roller diam. F	125	125	125	125	125	125	125	125	160	160	160
	Roller width G	40	40	40	40	40	40	40	40	50	50	50
Weight without enclosure (kg)		860	1050	1360	1840	2120	2520	2860	3850	4800	5200	7700

HV/LV distribution transformers

TRIHAL cast resin dry type transformers 160 to 3150 kVA
insulation level ⩽ 24 kV - low voltage 400 to 433 V - 50 Hz
thermal class F - ambient ⩽ 40° C, altitude ⩽ 1000 m



dimensions and weights
with IP31 metal enclosure

Dimensions and weights indicated in the table below are provided as an example for single voltage transformers with insulation level 12kV (1st table) and 24 kV (2nd table), according to electrical characteristics shown page 1.
Consequently, these tables give you approximate dimensions and weights for insulation level from 7.2 to 12kV (1st table) and from 17.5 to 24kV (2nd table).
Only the definitive drawings following from the order will commit us contractually.
For other voltages, impedance voltages and dual-voltages, weights and dimensions are different (consult us).

insulation level: 7.2 kV and 12 kV - low voltage 400 V to 433 V

rated power (kVA)		**160**	**250**	**400**	**500**	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**
dimensions (mm)	**Lenght A**	1650	1650	1700	1700	1700	1700	2000	2000	2150	2330	2330	2600
	Width B	950	950	1020	1020	1020	1020	1170	1170	1170	1270	1270	1270
	Height C	1750	1750	1900	1900	1900	1900	2400	2400	2480	2650	2650	2650
	Roller pitch D	520	520	670	670	670	670	820	820	820	1070	1070	1070
	Frame width E	645	645	795	795	795	795	945	945	945	1195	1195	1195
	Roller diam. F	125	125	125	125	125	125	125	125	125	160	160	160
	Roller width G	40	40	40	40	40	40	40	40	40	50	50	50
Total weight (kg)		960	1160	1450	1640	1840	2030	2480	2980	3720	4560	5410	7200

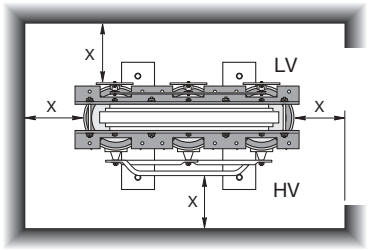
insulation level: 17.5 kV and 24 kV - low voltage 400 V to 433 V

rated power (kVA)		**160**	**250**	**400**	**630**	**800**	**1000**	**1250**	**1600**	**2000**	**2500**	**3150**
dimensions (mm)	**Lenght A**	1650	1650	1700	1800	1800	2000	2000	2150	2330	2330	2600
	Width B	950	950	1020	1020	1020	1170	1170	1170	1270	1270	1270
	Height C	1750	1750	1900	2050	2050	2400	2400	2480	2650	2650	2650
	Roller pitch D	520	520	670	670	670	820	820	820	1070	1070	1070
	Frame width E	645	645	795	795	795	945	945	945	1195	1195	1195
	Roller diam. F	125	125	125	125	125	125	125	125	160	160	160
	Roller width G	40	40	40	40	40	40	40	40	50	50	50
Total weight (kg)		1020	1200	1550	2050	2320	2680	3010	4170	5160	5560	8150

HV/LV distribution transformers

TRIHAL cast resin dry type transformers 160 to 3150 kVA
insulation level ⩽ 24 kV - low voltage 400 to 433 V - 50 Hz
thermal class F - ambient ⩽ 40° C, altitude ⩽ 1000 m

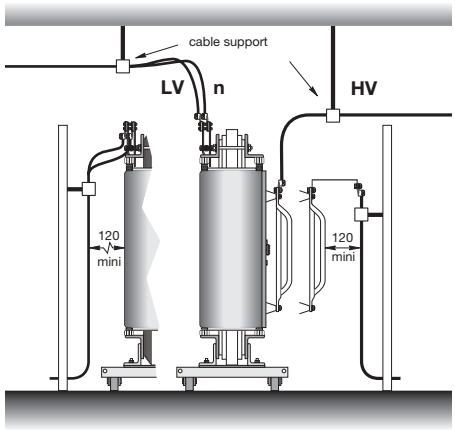
minimum clearances required



insulation (kV)	dimensions X (mm) full wall	grid wall
7.2	90	300
12	120	300
17.5 - 24	220	300

According to HD 637-1
Don't take into account the access to tapping on the UV side.

HV and LV standard connection



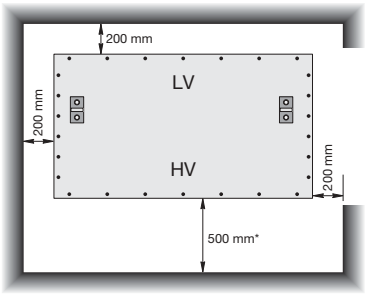
connections

TRIHAL transformers without enclosure housing (IP 00)

The winding resin coating and the plug-in connectors don't ensure any protection against touch when the transformer is energized.

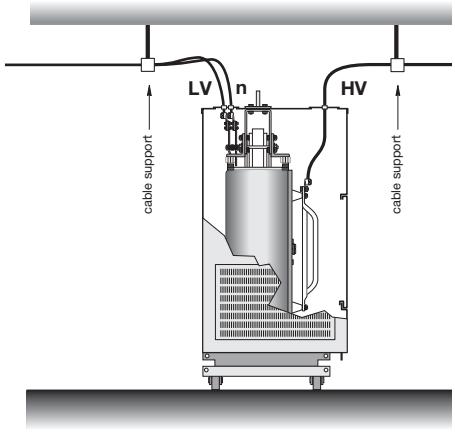
The contrator must ensure that cables and busbars are adequately supported to prevent mechanical stresses from being imposed on the transformer terminals, busbars or bushings.

minimum clearances required



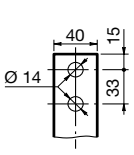
*500 mm. for an access to tapping on the HV side, but 200 mm. minimum.

HV and LV connection

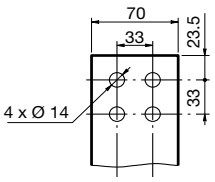


TRIHAL transformers with IP 31 metal enclosure

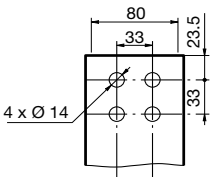
LV terminations



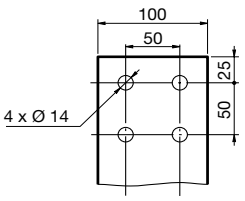
160 to 400 kVA*
thickness 5



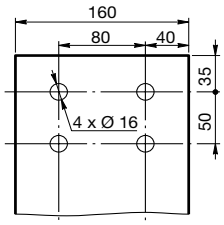
500 to 800 kVA*
thickness 6



1000 to 1250 kVA*
thickness 10



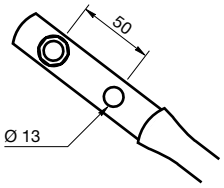
1600 kVA*
thickness 12



2000 kVA* thickness 10
2500 kVA* thickness 2×10

*Valid for aluminium terminations.

HV terminations



The contrator must ensure that cables and busbars are adequately supported to prevent mechanical stresses from being imposed on the transformer terminals, busbars or bushings.

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